

STEREO MOC Status Report
Time Period: 2017:016 - 2017:022

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 016, the MOC resumed operations on the primary command workstation after hard disk replacement and testing. The instrument teams were notified as some needed to reconfigure to use a different real-time stream, #106, to continue receiving real-time telemetry.
- On day 019, during the DSS-25 support, turbo decoder lock was lost intermittently beginning at 2035z through 2110z due to weather. This anomaly resulted in the loss of 6 frames of real-time and SSR data. See DR# G117766 for more information.

2. The following spacecraft/instrument events occurred during this week. The Ahead observatory operated nominally during this week.

- On day 019, the 95th momentum dump was executed successfully at 2100z, which imparted an estimated delta V of 0.094 m/sec. This was the 14th momentum dump that did not use the IMU. After thruster operations completed, there was a 0.63 degree of roll angle error which was dampened out over the next 9.8 minutes. Fine pointing stabilized 2.6 minutes after completion of the momentum dump.
- The average daily science data return for Ahead was 4.8 Gbits during this week.

STEREO Behind (STB) Status:

1. Detailed status of the recovery activities this week to restore operations is listed below.

- On day 020, during a 2.5 hour support with DSS-14, 260 commands were transmitted during the support. No carrier was detected by either the DSN station or the radio science receiver team after attempting to power on the TWTA for 30

minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

- On day 021, during a 3 hour support with the 34m station DSS-26 using the 80 KW transmitter to minimize 70m contentions, 320 commands were transmitted during the support. No carrier was detected by either the DSN station or the radio science receiver team after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.
- On day 022, during a 3.5 hour support with DSS-14, 380 commands were transmitted during the support. No carrier was detected by either the DSN station or the radio science receiver team after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

2. The Behind loss of communication anomaly occurred on October 1, 2014. Post superior solar conjunction, recovery operations resumed on November 30, 2015. By implementing the NASA Failure Review Board recommendations, the first recovery attempt began with carrier detection by the DSN on August 21st, through September 23, 2016. At a spacecraft range of ~2 AU, the observatory was found to be rotating slowly about its principal axis of inertia for which the uncontrolled attitude allowed some solar array input and continuous uplink and downlink communications on the LGA at emergency data rates. Over the next 22 continuous days, significant obstacles to recovery were overcome with a collaborative effort of the JHU/APL engineering team, NASA GSFC, DSN, FDF, SSMO scheduling, and Mission Operations teams. This consisted of:

- Reliably commanding a rotating spacecraft with uncontrolled attitude at a distance of 2 AU
- How to power on the spacecraft that was never designed to be off without collapsing the battery voltage
- Acquiring telemetry at 35 bps from a spacecraft that is rotating with an uncontrolled attitude

- Warming a frozen propulsion subsystem with a degraded battery and limited solar array input with an uncontrolled attitude
- Configuring, loading, and verifying EA, C&DH, and G&C parameters and macros with very limited telemetry
- Conducting an autonomous momentum dump in the blind and transitioning to C&DH standby mode and successfully receiving telemetry on the HGA indicating star tracker lock and decreasing system momentum.

However, system momentum level remained above the threshold for re-establishing attitude control with the reaction wheels. Due to the uncontrolled attitude, communication degraded and the last detection of the carrier was on September 23rd.

Behind Observatory Status - From the last telemetry received on September 18th, main bus voltage is low, 2 out of 11 battery cells are currently not functioning, attitude remains uncontrolled, rotating at a ~45 second period about its principal axis of inertia. While propellant is suspected to be frozen, last telemetry indicated both propulsion tank latch valves are open and pressure transducer #2 is not functioning. EA mode is enabled. The battery charge rate is C/10. Necessary macro sequences have been tested to allow the peak power tracker in C&DH standby mode to protect the battery. These macro sequences will be loaded to EEPROM when the communications supports longer commands.

Monthly recovery efforts consist of attempting to power on the transmitter for 30 minutes. If no carrier signal is detected, battery recovery operations will commence which consist of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off. The next recovery tracks are on February 17th, 18th, and 19th.